

## Group B Streptococcal Soft Tissue Infections Beyond the Neonatal Period

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*In one year sporadic soft tissue infections due to group B streptococci were identified in 37 patients beyond the neonatal period. Serious underlying conditions were present in 25 patients (68%), including 17 (46%) who had diabetes mellitus and 4 (11%) with paraplegia. Unlike previous reports, 12 patients (32%) were previously healthy. Infection developed in 8 persons as a result of minor trauma. The mean age of the normal hosts was 20.9 years, whereas the mean age of patients with underlying disease was 44.2 years ( $P < .0005$ ). The clinical spectrum was varied and included abscess formation in 17 patients (46%). All patients required treatment with antibiotics and 28 (76%) required admission to hospital. Complete recovery occurred in 33 patients (89%) while 4 with diabetes required amputation of infected extremities. Group B Streptococcus was the only organism identified in 22 patients (59%) while mixed organisms were cultured in 15 (41%), including Staphylococcus aureus in 12 and gram-negative enteropathogens in 4. Group B streptococcal soft tissue infections beyond the neonatal period are common and may even involve normal hosts.*

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Lancefield group B streptococci (*Streptococcus agalactiae*) are recognized as common pathogens in neonates.<sup>1</sup> Infections in older patients have been described less frequently and usually occur in postpartum women, persons with diabetes mellitus and immunocompromised hosts.<sup>2-5</sup> Infections are considered unusual in normal adults, and involvement of the skin and underlying soft tissues is seen infrequently.<sup>6</sup> In recent years we have noted in our hospital microbiology laboratory frequent group B streptococcal organisms identified in wounds. In 12 months 37 patients proved to have soft tissue infections due to group B streptococci, and we noted that many of these patients were otherwise normal.

### Patients and Methods

Medical records of all patients older than 2 months of age with group B streptococcal organisms identified from the skin and adjacent soft tissues at Valley Medical Center, Fresno, California, between April 1, 1984, and April 1, 1985, were reviewed. The study period was arbitrarily chosen and the results are consistent with our continued observations. Group B streptococci were identified by colony morphology, CAMP testing, bacitracin sensitivity and agglutination with group-specific antiserum.

### Results

In the one-year study period, group B streptococcal organisms were recovered from wound cultures of 37 non-neonatal patients (Table 1). In all patients the physical findings were consistent with cellulitis—erythema, swelling and tenderness. In all, 14 patients were febrile and 17 had abscess formation requiring incision and drainage of purulent mate-

rial. Preexisting medical conditions were seen in 25 patients. Of these, 17 had diabetes mellitus: 11 with infected extremities, 3 with abscesses in the inguinal region, 2 with buttock abscesses and 1 with cellulitis of the labia majora. Other patients with underlying medical problems included four paraplegic patients with infected sacral decubitus ulcers, an intravenous drug abuser with a hand abscess, a patient with chronic renal failure with cellulitis around an arteriovenous fistula, a person with chronic alcoholism with cellulitis over the sternoclavicular joint and a postpartum patient with an infected cesarean section wound. Five of the diabetic patients with infected extremities and two of the paraplegic patients had prior episodes of soft tissue infections, although group B streptococci were previously identified in only three diabetic patients. No infections were nosocomial.

Twelve patients had no history of preexisting medical conditions, and most had infected extremities due to trauma. In one 14-month-old infant group B streptococcal organisms were identified from an impetiginous skin lesion, and one 44-year-old man was admitted to hospital with an infected sunburn.

Surgical therapy was required in 24 patients, including incision and drainage of abscesses in 17, debridement of devitalized tissue in 3, removal of an arteriovenous fistula in 1 and amputation of nonviable extremities in 4 diabetic patients. All patients received antimicrobial therapy while 28 required hospital care. A total of 36 patients was seen in follow-up and all eventually recovered.

The patients ranged in age from 14 months to 65 years. The previously healthy patients were significantly younger (mean age 20.9 years versus 44.2 years) than those with underlying medical problems ( $P < .0005$ , unpaired *t* test). In

all. 30 patients were male and 7 were female. The duration of symptoms ranged from two days to two years. Fourteen patients had a history of fever, chills or both.

Group B *Streptococcus* was the only organism identified in wounds in 22 patients, including 11 of 17 patients with diabetes mellitus, 4 of 8 previously healthy patients with trauma and 2 of 4 with paraplegia. Mixed organisms were cultured in 15 patients: organisms included *Staphylococcus*

*aureus* in 12 and gram-negative enteric pathogens in 4. Group B *Streptococcus* was the only organism identified in 12 of 17 patients with abscesses, although anaerobic cultures were infrequently done. Gram's stains of infected material were available in 26 patients. In 22 specimens with organisms seen, 18 showed a predominance of streptococci. Blood cultures were done in only seven patients, including five patients with fever. All were negative, although one patient was re-

TABLE 1.—Clinical Characteristics of Patients With Group B *Streptococcus* Soft Tissue Infections

Case #	Age, yr	Sex	Duration of Complaints	Fever	Chills	Site and Type of Infection	Underlying Problem	Other Organisms Isolated	Blood Culture	Therapy	Outcome
1	49	♀	3 wk	No	No	Inguinal abscess	DM	...	ND	I&D; Dicloxacillin PO	Resolved
2	52	♂	6 d	No	No	BKA stump abscess	DM	<i>Staphylococcus aureus</i>	ND	Debridement; nafcillin IV	Resolved
3	56	♂	6 mo	No	No	Infected toe ulcer	DM	<i>Staphylococcus aureus</i>	ND	Nafcillin IV; amputation	Resolved
4	35	♂	3 wk	No	No	Inguinal abscess	DM	Gram-negative enteropathogen	...	Penicillin, gentamicin sulfate	Resolved
5	50	♀	4 d	No	No	Cellulitis of labia majora	DM	...	ND	Erythromycin PO	Resolved
6	54	♂	1 mo	No	No	Infected toe ulcer	DM	...	ND	Cefazolin IV; amputation	Resolved
7	55	♂	4 d	No	No	Hand abscess	DM	...	ND	I&D; cefazolin IV	Resolved
8	19	♀	20 d	No	No	Cellulitis of cesarean section wound	Post-partum	<i>Staphylococcus aureus</i>	ND	Ampicillin IV	Resolved
9	60	♂	5 d	No	No	Cellulitis of hand	DM	...	ND	Dicloxacillin PO	Resolved
10	65	♂	1 d	Yes	Yes	Infected toe ulcer	DM	...	...	Ampicillin IV, gentamicin	Eventual amputation
11	62	♀	4 d	No	No	Hand abscess	DM	<i>Staphylococcus aureus</i> , <i>Klebsiella oxytoca</i> , <i>Citrobacter freundii</i>	...	I&D; cefazolin IV	Resolved
12	56	♀	2 d	Yes	No	Toe abscess	DM	<i>Escherichia coli</i>	...	I&D; nafcillin IV	Resolved
13	40	♂	2 wk	Yes	Yes	Chest wall abscess	Ethanol abuse	...	...	I&D; penicillin IV	Resolved
14	59	♂	3 d	No	No	Finger abscess	DM	...	ND	I&D; cefazolin IV	Resolved
15	50	♂	3 d	Yes	No	Buttock abscess	DM	...	ND	I&D; ampicillin PO	Resolved
16	31	♂	1 wk	Yes	No	Infected decubitus ulcer	Paraplegia	<i>Staphylococcus aureus</i>	ND	Debridement; erythromycin PO	Eventual skin graft
17	65	♀	?	?	?	Foot abscess	DM	...	ND	I&D; cefazolin IV	Eventual osteomyelitis and amputation
18	29	♂	4 d	Yes	Yes	Infected decubitus ulcer	Paraplegia	...	ND	Dicloxacillin PO	Eventual skin graft
19	21	♂	3 d	No	No	Inguinal abscess	DM	...	ND	I&D; cefazolin IV	Resolved
20	28	♂	6 d	No	No	Infected decubitus ulcer	Paraplegia	...	ND	?	?
21	39	♀	3 d	No	No	Perirectal abscess	DM	...	ND	I&D; cefazolin IV, clindamycin, gentamicin	Resolved
22	24	♂	2 d	Yes	Yes	Infected decubitus ulcer	Paraplegia	<i>Staphylococcus aureus</i>	...	Debridement; clindamycin IV, gentamicin	Resolved
23	34	♀	?	No	No	Infected arterio-venous shunt	Chronic renal failure	<i>Klebsiella oxytoca</i>	ND	Cefazolin IV; graft removal	Resolved
24	39	♂	2 d	Yes	Yes	Hand abscess	IV drug abuse	<i>Staphylococcus aureus</i>	ND	I&D; cefazolin IV	Resolved
25	61	♂	?	No	No	Infected leg ulcer	DM	<i>Staphylococcus aureus</i>	ND	Dicloxacillin PO	Resolved
26	10	♂	6 d	No	No	Cellulitis of leg	Trauma	...	ND	Oxacillin IV	Resolved
27	50	♂	2 wk	No	No	Cellulitis of foot	Trauma	...	ND	Dicloxacillin IV	Resolved
28	9	♂	2 d	No	No	Hand abscess	Trauma	...	ND	I&D; cefazolin IV	Resolved
29	19	♂	1 d	No	No	Hand abscess	Human bite	...	ND	I&D; nafcillin IV, clindamycin, gentamicin	Resolved
30	15	♂	3 d	Yes	No	Cellulitis of hand	Trauma	<i>Staphylococcus aureus</i>	ND	Cefazolin IV	Resolved
31	30	♂	1 wk	Yes	No	Axillary abscess	...	<i>Staphylococcus aureus</i>	ND	I&D; cefazolin IV	Resolved
32	2	♂	4 d	Yes	No	Facial cellulitis	Trauma	<i>Staphylococcus aureus</i>	...	Nafcillin IV	Resolved
33	1	♂	3 d	Yes	No	Impetigo	...	<i>Staphylococcus aureus</i>	ND	Dicloxacillin PO	Resolved
34	44	♂	3 d	No	No	Cellulitis of leg	Sun-burn	...	ND	Erythromycin IV	Resolved
35	18	♂	2 d	Yes	Yes	Cellulitis of hand	Trauma	...	ND	Cefazolin IV	Resolved
36	24	♂	2 yr	No	No	Buttock abscess	...	...	ND	I&D; oxacillin IV	Resolved
37	29	♂	5 d	Yes	No	Neck abscess	...	...	ND	I&D; cefazolin IV	Resolved

BKA=below-the-knee amputation, DM=diabetes mellitus, I&D=incision and drainage, IV=intravenously, ND=not done, PO=by mouth, ?=data not available

ceiving oral antibiotics when blood specimens were drawn for culture.

## Discussion

Group B streptococci usually cause infections in neonates. In adults the most frequent types of disease include genital tract infections in postpartum women and bacteremia, meningitis, pneumonia, septic arthritis and pyelonephritis.<sup>2,7</sup> The organism is usually recognized as an opportunistic pathogen in patients with underlying medical conditions.<sup>2,3,7-9</sup> Soft tissue infections have not been well described and frequently involve patients with surgical wounds or with diabetes mellitus and peripheral vascular disease.<sup>3,8,10</sup> There have also been occasional reports of paronychia, impetigo, penile cellulitis and infection of burn wounds and decubitus ulcers associated with group B streptococci.<sup>6,9,11-14</sup>

Our data suggest that group B streptococcal soft tissue infections may be more common than previously recognized. These findings are also notable in that 32% of our patients were previously healthy and abscesses developed in 46%. Patients without underlying medical problems were usually younger and most had infections at sites of minor trauma. Our high ratio of male to female patients (4.3:1) corresponds with that of other series.<sup>7,15</sup>

Previous reports of group B streptococcal soft tissue infections frequently note the presence of other microorganisms on culture and, thus, question the role of group B *Streptococcus* as a primary pathogen.<sup>3,8</sup> The presence of group B *Streptococcus* as the sole organism identified in wounds in 59% of our patients indicates that it can function as a primary pathogen. Although in patients with mixed infections pathogenicity cannot be proved, streptococci were the predominant organisms on 18 of 22 wound Gram's stains with organisms seen. Also remarkable was its presence as the only organism in 71% of patients with abscesses. The presence of *Staphylococcus aureus* as a copathogen in 12 patients is notable because this has been seen in studies of pneumonia and bacteremia caused by group B *Streptococcus*.<sup>16,17</sup>

Bacteremia was documented in none of our patients although blood cultures were done in only seven. The prevalence of bacteremia in this group of patients is not known as group B streptococcal bacteremia may be brief and not accompanied by hypotension.<sup>2,16</sup> No bacteremias due to group B *Streptococcus* were identified in non-neonates at our institution during the study period. Although some authors have

found the skin to be a common source of group B streptococcal bacteremia in adults, most have shown that soft tissue infections infrequently lead to bloodstream invasion.<sup>2,8,16,18,19</sup>

Despite the presence of group B *Streptococcus* as the sole wound isolate in 22 of our patients, antistaphylococcal antibiotics were used in most patients. It is unclear why these were chosen, but the cost of therapy could have been decreased with more specific therapy. Penicillin is the antibiotic of choice for group B streptococcal infections.

Group B streptococcal soft tissue infections usually occur in unhealthy hosts. They are frequently seen in otherwise healthy persons, however, and these patients are younger. Infected patients are more frequently male than female. Group B *Streptococcus* frequently leads to abscess formation and is usually the only organism involved.

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